Quarterly Report – Public Page

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Contract Number: DTPH56-16-T-00004

Prepared for: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (DOT/PHMSA)

Project Title: EMAT Guided Wave Technology for Inline Inspections of Unpiggable Natural Gas Pipelines

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For quarterly period ending: December 31, 2016

Project Goals:
The goal of the project is to test and evaluate EMAT guided wave sensor in the lab with the objective of using the sensor for inline inspection of cast iron and steel mains. Such a sensor would be integrated with ULC's CIRRIS XI^{TM} robot that already successfully employs normal beam EMAT for inline inspection. The combined use of both EMAT guided wave, and normal beam would essentially result in being able to provide 100% inspection coverage providing an increased accuracy in detecting threats.

The first part of the project is to select, and then test and evaluate EMAT guided wave sensors and obtain a good understanding of the performance and limitations of the sensors. Additionally, the data collected during the test will be used in the second part of the project to attempt to detect and classify defects and flaws using post-processing techniques and algorithms. Finally, in the third part of the project, the preliminary conceptual design will be conducted to integrate the sensors with the CIRRIS XI^{TM} robot.

Work Performed:
The research team has put together an approach for testing and evaluating the EMAT guided wave sensors. A test plan was generated that contains the overall test approach, the goals of testing, test procedures, test setup, and the requirements for test bench design. Preliminary dispersion curves have been generated for steel using MATLAB. ULC has selected, purchased, and received the EMAT guided wave sensors for testing. The initial design of the test benches has been completed.

Results and Conclusions: None so far.

Plans for Future Activity:

- Develop dispersion curves for cast iron using MATLAB. Refine the dispersion curves of both steel and cast iron using actual material properties.
- Complete design and fabrication of test benches
- Purchase test materials and set up test equipment
- Begin testing using EMAT guided wave sensors